THE PLANT DISEASE REPORTER

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FOREWORD

The Plant Disease Reporter inaugurates its seventeenth volume at a time when travel and field work by plant pathologists is more restricted than during any recent period and when publication through the regular channels is unusually slow. Under these difficult circumstances The Plant Disease Reporter hopes to be able to perform a service of unique importance in the continued progress of Plant Pathology.

The lists published below of ornamental plants infected with the Curly Top or Yellows diseases in California will be of special interest to the numerous students of virus diseases. We are able to present the results of the studies of Severin and Freitag, through the courtesy of the Division of Entomology and Parasitology of the College of Agriculture, University of California, and the Bureau of Entomology, United States Department of Agriculture.

(Neil E. Stevens.)

LIST OF ORNAMENTAL FLOWERING PLANTS NATURALLY INFECTED WITH CURLY TOP OR YELLOWS DISEASES IN CALIFORNIA

Henry H. P. Severin and Julius H. Freitag

CURLY TOP: Fifteen species of ornamental flowering plants in fourteen genera belonging to eleven families have been found to be naturally infected with curly top in California. Previous noninfective beet leafhoppers, Eutettix tenellus (Baker), exposed to the naturally infected plants transmitted curly top to sugar beets from eleven of the fifteen species of plants. In the following list of plants the curly-top virus was not recovered from stocks, carnation, and geranium but these plants showed reliable symptoms of the disease.

Chenopodiaceae, goosefoot or saltbush family: Summer cypress or Mexican fire plant (Kochia scoparia var. trichophylla).

Amaranthaceae, amaranth family: Cockscomb (Celosia argentea var. cristata.)

Nyctaginaceae, four o'clock family: Four o'clock or Marvel-of-Peru (Mirabilis jalapa).

Caryophyllaceae, pink family: Sweet William (Dianthus barbatus), carnation (D. caryophyllus).

Brassicaceae, mustard family: Stocks (Mathiola incana, M. incana var. annua).

Geraniaceae, geranium family: Geranium (Pelargonium hortorum).

Tropaeolaceae, tropaeolum family: Garden nasturtium (Tropaeolum majus).

Violaceae, violet family: Pansy (Viola tricolor var. hortensis).

Solanaceae, nightshade family: Common garden petunia and double-ruffled petunia (Petunia hybrida).

Dipsacaceae, teasel family: Sweet scabious (Scabiosa atropurpurea).

Compositae, composite family: Zinnia (Zinnia elegans), cosmos (Cosmos bipinnatus), calliopsis (Coreopsis tinctoria), strawflower (Helichrysum bracteatum).

YELLOWS: Two species and three varieties of ornamental flowering plants belonging to two families have been found to be naturally infected with yellows in California. The virus was transmitted by previously noninfective leafhoppers, Cicadula divisa Uhl. from the naturally infected plants to healthy asters and celery.

Compositae, composite family: Zinnia (Zinnia elegans), Double Giant Pink, Dahlia Flowered, and Lilliput Scarlet Gem; strawflower (Helichrysum bracteatum).

LIST OF ORNAMENTAL FLOWERING PLANTS EXPERIMENTALLY INFECTED WITH CURLY TOP

Julius H. Freitag and Henry H. P. Severin

(See foreword above)

The curly-top disease of sugar beets was experimentally transmitted under greenhouse conditions by the beet leafhopper, Eutettix tenellus (Baker), to 90 species of ornamental flowering plants in 72 genera belonging to 33 families. In the following list of infected plants, previously noninfective beet leafhoppers recovered the virus and transmitted curly top to sugar beets.

Moraceae, mulberry family: Japanese hop (Humulus japonicus).

Chenopodiaceae, goosefoot family: Summer cypress (Kochia scoparia tricophylla).

Amaranthaceae, amaranth family: Tassel amaranth (Amaranthus paniculatus), love-lies-bleeding (Amaranthus caudatus), dwarf Joseph's coat (Amaranthus tricolor), feather celosia (Celosia argentea), globe amaranth (Gomphrena globosa).

Nyctaginaceae, four o'clock family: Four o'clock flower (Mirabilis jalapa).

Portulacaceae, purslane family: Common rock purslane (Calandrinia grandiflora), rose moss (Portulaca grandiflora), portulaca (Portulaca sp.).

Caryophyllaceae, pink family: Carnation (Dianthus caryophyllus), Chinese pink (D. chinensis), Heddewig pink (D. chinensis heddewiggi), garden pink (D. plumarius), perennial Sweet William (D. barbatus), annual Sweet William (Dianthus sp.), baby's breath (Gypsophila paniculata), Maltese cross (Lychnis chalcedonica), catchfly (Silene pendula).

Ranunculaceae, crowfoot family: Poppy anemony (Anemone coronaria), love-in-a-mist (Nigella damascena), red larkspur (Delphinium nudicaule).

Papaveraceae, poppy family: Iceland poppy (Papaver nudicaule), oriental poppy (P. orientale), Salmon Queen poppy (P. orientale), oriental hybrid poppy (P. orientale).

Capparidaceae, caper family: giant spider plant (Cleome spinosa).

Brassicaceae, mustard family: Sweet rocket (Hesperis matronalis), candytuft (Iberis umbellata), honesty (Lunaria annua), ten weeks stock (Mathiola incana annua).

Resedaceae, mignonette family: Common mignonette (Reseda odorata).

Geraniaceae, geranium family: Geranium (Pelargonium hortorum).

Tropaeolaceae, tropaeolum family: Canary-bird flower (Tropaeolum peregrinum).

Euphorbiaceae, spurge family: Snow-on-the-mountain (Euphorbia marginata).

Sapindaceae, soapberry family: Balloon-vine (Cardiospermum halicacabum).

Malvaceae, mallow family: Tree mallow (Lavatera trimestris).

Violaceae, violet family: Violet (Viola cornuta).

Onagraceae, evening primrose family: Clarkia (Clarkia elegans).

Umbelliferae, parsley family: Blue lace-flower (Trachymene caerulea).

Primulaceae, primrose family: Oxslip (Primula polyantha), primrose (P. saxatalis), cowslip (P. veris).

Plumbaginaceae, leadwort family: Sea lavendar (Limonium sinuatum).

Apocynaceae, dogbane family: Madagascar periwinkle (Vinca rosea).

Convolvulaceae, morning-glory family: Brazilian morning-glory (Ipomoea setosa), crimson starglory (Quamoclit lobata).

Polemoniaceae, phlox family: Annual phlox (Phlox drummondii), cobaea (Cobaea scandens).

Hydrophyllaceae, water-leaf family: Calico flower (Nemophila maculata).

Boraginaceae, borage family: Alkanet (Anchusa azurea), Chinese forget-me-not (Cynoglossum amabile), common heliotrope (Heliotropium peruvianum), true forget-me-not (Myosotis scorpioides).

Labiatae, mint family: Scarlet sage (Salvia splendens).

Solanaceae, nightshade family: Browallia speciosa, winged tobacco (Nicotiana alata), Rosy Morn petunia (Petunia hybrida), Salpiglossis sinuata, butterfly-flower (Schizanthus wisetonensis).

Scrophulariaceae, figwort family: Kenilworth ivy (Cymbalaria muralis), monkey flower (Mimulus luteus), pouched nemesia (Nemesia strumosa), foxglove (Digitalis ambigua).

Acanthaceae, acanthus family: Black-eyed Susan (Thunbergia alata).

Cucurbitaceae, gourd family: Mock Orange, Nest Egg, and Turk's Turban gourds (Cucurbita pepo), African Pipe Calabash, Dipper Shaped, Hercules Club, Powder Horn, and Spoon gourds (Lagenaria leucantha), Chinese loofa gourd (Luffa cylindrica), serpent or snake gourd (Trichosanthes anguina), Knob Kerrie gourd.

Lobeliaceae, lobelia family: Cardinal flower (Lobelia cardinalis), and Lobelia erinus.

Compositae, composite family: African blue daisy (Arctotis stoechadifolia), true or English daisy (Bellis perennis), Swan River daisy (Brachycome iberidifolia), pot marigold (Calendula officinalis), basket flower (Centaurea americana), corn flower (Centaurea cyanus), sweet sultan (Centaurea moschata), garland chrysanthemum (Chrysanthemum coronarium), marguerite or Paris daisy (Chrysanthemum frutescens), Inodorum snowball (Matricaria inodora), yellow-leaved pyrethrum (Chrysanthemum parthenium), calliopsis (Coreopsis tinctoria), cosmos (Cosmos bipinnatus), Giant flowering cosmos (Cosmos bipannatus), crested cosmos (Cosmos hybrida), African orange daisy (Dimorphotheca aurantiaca),

cucumber-leaved sunflower (Helianthus debilis), wild sunflower (Helianthus decapetalus), strawflower (Helichrysum bracteatum), acroclinium (Helipterum roseum), African marigold (Tagetes erecta), French marigold (Tagetes patula).

DISEASES OF ORNAMENTALS

A NEW VIRUS DISEASE OF DELPHINIUM IN IDAHO

C. W. Hungerford

An apparently unreported disease of cultivated delphiniums has been noted at several points in Idaho during the last two years. The disease was first noted in several gardens at Moscow, where it had caused considerable damage in several very fine plantings of delphinium. It was also found in one garden in the Boise Valley near Boise. The symptoms of the disease would at once suggest witches'-broom as a common name due to the fact that the upper portion of the infected plants present a decided witches'-broom appearance. Excessive proliferation of the flowering stalk results in a bunched growth which may be twelve to eighteen inches in diameter. The leaves, petioles and aborted flowering parts are very much dwarfed, and some of the leaves are extremely elongated. The diseased portion of the plant is, in general, a lighter green color than the healthy portion, and irregular chlorotic areas are to be found in abundance upon the leaves. Necrotic streaks appear on the stalks and on the petioles.

Repeated attempts have failed to produce a causal organism for this trouble, and the appearance and general conditions surrounding the occurrence of this disease would indicate that it is probably due to a virus.

It has been possible to eradicate the disease from infected plantings by roguing and destroying all the infected plants. (Nov. 1, 1932).

SCAB OF CULTIVATED SWEET VIOLET (VIOLA ODORATA) CAUSED BY SPHACELOMA

Anna E. Jenkins

The known range (New York, Pennsylvania, and Georgia) and symptoms of this disease, together with the characteristics of the causal fungus, apparently a new species, were reported at the Meetings of the American Phytopathological Society, in December, 1932. (Massey, L. M., R. P. White, and A. E. Jenkins, a disease of cultivated sweet violet caused by Sphaceloma. Phytopathological Abstracts. Preprinted from Phytopathology 23, January, 1933, p. 23-24).

The available information indicates that where known, scab is at the present time the most important disease of field-grown violets. In order to obtain further data on the history, range and prevalence of the disease,

it is requested that during the coming season pathologists be on the lookout for this disease, particularly in the field, and that specimens of violet affected by the disease or apparently so affected, be sent to the Plant Disease Survey for verification and record.

DISEASES OF CEREAL AND FORAGE CROPS

BACTERIAL WILT IN DENT CORN IN ILLINOIS, 1932

Benj. Koehler and J. R. Holbert

In June, when the plants were hardly knee high, it was observed in some fields of dent corn that plants were wilting and some of them dying. These plants showed yellow vascular bundles and yellow bacteria similar to those in wilt infected sweet corn. Many of these plants also had rotted cavities in the center of the lower end of the young stalks. Similar cavities also were observed in some wilt infected sweet corn plants, especially in some of the later varieties.

In July a leaf blight was observed and by the middle of August this became very severe over much of the State. This blight was quite distinct as compared with other known leaf spots, blights and firing. Viscous yellow bacteria were found in connection with this blight and it appeared highly probable that this condition also was caused by the Stewart's organism (Aplanobacter stewartii).

A survey was then undertaken to determine the general situation of bacterial wilt in dent corn in the State. A total of 66 fields was examined during the first half of September. These were selected at random and represented the State fairly well, except for the extreme southern end.

The leaf blight was found on nearly every plant in every field examined. Loss of green leaf area which could clearly be attributed to specific infections on the leaves ranged from a trace to 50 per cent, with an average of 16.6 per cent. Stalks with yellow vascular bundles also were found in nearly all the fields examined. The number was as high as 85 per cent in one field, with an average of 6.2 for all fields.

An unusual number of prematurely dead plants occurred in most of the fields. This was most pronounced in fields where wilt infection was heavy and the two clearly appeared to be associated. The percentage of dead plants ran up to 45 and 47 per cent in some cases. In many fields the most of these prematurely dead plants had severe Diplodia infection near the base of the stalk, but in a few fields prematurely dead stalks were abundant with nearly an absence of Diplodia infection. Apparently wilt infection had been the primary cause in the premature dying of many of these plants and this condition had given an unusual opportunity for Diplodia invasion.

Evidences of early or primary infection were found in most fields. These often appeared as stunted plants; with stalks considerably shorter and thinner than normal. Often there was marked shortening of the internodes. Many of these plants had cavities in the lower part of the stalks and in some cases they extended up to the ear node. While some plants with primary infection had been observed dying early in the season, those seen later in the survey, strangely enough, had green stalks in spite of the cavities in the stalks and abundant bacterial ooze in most of the bundles. The leaves of such plants of course were more or less blighted. The prematurely dead plants mentioned earlier were full sized plants with dead stalks as well as leaves and appeared to be the result of severe leaf infection rather than primary stalk infection.

There evidently are two kinds of leaf blight caused by A. stewartii. One is a general firing of the distal end and edges of the leaves involving more or less of the leaf surface according to the severity of the infection. This is caused by disturbances within the stalk. The other type is the result of infections directly on the leaves. In this case characteristic lesions are produced. The latter was the principal cause of leaf blight in dent corn in Illinois this year.

In plants where stalk infection was abundant, very often bacterial ooze was found exuding from pores on the inner husks so that the corn kernels were literally covered with it. In a few cases it was so abundant that it had flowed down and collected in a mass around the base of the ear.

FOOT ROT OF SPRING WHEAT IN MONTANA

Foot rot due mainly to Helminthosporium sativum caused serious damage to spring wheat near Great Falls and Fort Benton. According to Paul A. Young, this is the first time that spring wheat has been injured very much in Montana. Young reports, "Seed loans became available too late so a large acreage of spring wheat was planted around May 15 to June 1. Foot rot severely damaged such wheat in many fields which grew in warm weather. Drought was associated as a factor."

BACTERIAL WILT OF ALFALFA IN IDAHO

Bacterial wilt of alfalfa, caused by (Aplanobacter insidiosum), has again caused serious damage in certain parts of Idaho. The disease is commonly present in irrigated alfalfa fields throughout the south-central and southwestern part of the State. In Idaho, bacterial wilt has been limited to those sections where there has been an abundance of irrigation water and fairly high summer temperatures. Close pasturing in the fall and severe freezing resulting in winter injury are both conducive to the spread of the disease. Common alfalfa is apparently the most resistant and has given the highest yields of seven varieties tested for the last two years.

(C. W. Hungerford).

GRASS ERGOT FROM ARIZONA

Specimens, collected in 1931, of the grass Hilaria mutica affected by ergot were sent in by Wyatt W. Jones of Douglas, Arizona, with the remark, "It is common to see more or less of this fungus in the heads of the grass named every season but this year (1931) it is so prevalent that it alters the appearance of the landscape." The ergot was determined by J. A. Stevenson as Claviceps cinereum D. Griff. Previous to this collection the fungus was known only from the type locality, Cochise, Arizona.

DISEASES OF SUGAR CROPS

PRELIMINARY NOTES ON A LEAF DISEASE OF SUGAR CANE IN FLORIDA

B. A. Bourne

During the past two years, a very common leaf disease appeared among certain sugar cane seedling progenies which has not yet been recorded from continental United States to the knowledge of the writer. A careful diagnosis revealed the fact that the disease is identical with the "brown spot" due to Cercospora longipes Butler.

Some varieties, particularly those of the thin-stemmed type, are so susceptible that the outer half of the foliage presents a blasted appearance due to the countless lesions. The disease from the breeder's standpoint has assumed a role of major importance in the selection of new seedling varieties.

Among commercial varieties, only CO. 281 has so far shown a sufficient number of spots to warrant mention, although this cane is regarded as being very resistant. The thick-stemmed POJ. canes such as 2714, 2725, and 2878, as well as the "noble" variety S.C. 12-4 appear to be practically immune. Certain of the newer and otherwise promising medium to small-stemmed seedlings, e.g., F. 29-362, F. 30-62, and F. 30-64 are very susceptible, the parentage in all cases being CO. 281 ♀ x U. S. 1694. ♂ (the male parent being a seedling of POJ. 213).

The parasite has been isolated in pure culture and is being studied physiologically and in other ways.

The disease has so far been observed in all sections of Florida where susceptible varieties have been planted and is considered to be well established. The disease had been reported previously from India, Cuba, Porto Rico, the British West Indies, and Brazil.

V E G E T A B L E D I S E A S E S

VIOLET ROOT ROT ON SWEET POTATO

Two reports of the occurrence of Rhizoctonia crocorum on sweet potato were received recently. In November, R. F. Crawford sent in specimens from the vicinity of Portales, New Mexico, with the statement that the disease was causing considerable damage where it was found. O. H. Elmer reported that the disease occurred in a commercial field near Manhattan, Kansas.

Rhizoctonia crocorum does not seem to be common on sweet potato. These are the first records in the Survey files.

SCLEROTINIA ROT OF LETTUCE IN ARIZONA

This disease first appeared in the Eloy District about six years ago, when a very small spot was affected. In November, 1931, it affected approximately 120 acres. At the present time one forty-acre tract shows 100 per cent infection, and another tract of the same size shows a 50 per cent infection. A new infection has appeared at a distance of approximately ten miles from the ranch on which the disease was bad last year. For the first time the apothecial stage is abundant. (J. G. Brown, Dec. 9).

D I S E A S E S C A U S E D B Y N E M A T O D E S

The root-knot nematode, Caconema radicicola, was found in three new hosts: in Hepatica caeruleaa, horticultural color form of H. nobilis Mill. (H. triloba Chaix.) imported from England, and Alnus japonica Sieb. & Zucc. from Maryland, intercepted by D. P. Limber of the Inspection House, Bureau of Plant Quarantine, Washington, D. C., and in Euphorbia pulcherrima Willd. (Poinsettia pulcherrima), by Mr. D. L. Gill, of the Department of Plant Pathology, Cornell University.

Tylenchus dipsaci was found in onions from Sweden, a new locality for the disease on this host; and in lily-of-the-valley pips (Convallaria majalis L.) from Holland, a new host for this parasite. Specimens intercepted by Bureau of Plant Quarantine Inspectors in Philadelphia.

A heavy infestation by a new Hoplolaimus species, closely related to Hoplolaimus coronatus Cobb, was observed mainly in the roots but also in the bulb and leaves of a nerine lily (Nerine sarniensis Herb.) from North Carolina, submitted by R. W. Leiby, State Entomologist, through the courtesy of Dr. S. B. Fracker of the Bureau of Plant Quarantine. (G. Steiner, Edna M. Buhrer, and W. D. Courtney).

FURTHER NOTES ON THE NEMATODES ASSOCIATED WITH THE SORESHIN OF COTTON

J. R. Christie, Bureau of Plant Industry, U. S. Dept. of Agriculture
and C. H. Arndt, South Carolina Experiment Station

In an earlier issue of the Reporter (Vol. 15: 82-83. July 15, 1931) attention was called to the possible role of Aphelenchoides parietinus (Bastian, 1865) and other nemas in causing the soreshin of cotton. Studies which were made in the greenhouse during the winter of 1931-2, indicated that nemas other than A. parietinus were more abundant in the diseased seedlings than had been indicated by the determinations of the previous season. As it thus seemed advisable to secure some further information concerning the prevalence of the various species of nemas in diseased cotton seedlings, numerous seedlings were studied directly as they were collected from several cotton fields in the spring of 1932. All identifications and notes on the distribution and relative abundance of the various species are the work of Christie.

Between May 21 and June 10, 1932, a survey was made to determine what nematodes inhabit the tap-roots and hypocotyls of diseased cotton seedlings and the relative abundance of each species. For this purpose seedlings, the hypocotyls of which showed distinct lesions, were collected from fields located at the Pee Dee Experiment Station, Florence, South Carolina, at the Sandhill Experiment Station, near Columbia, South Carolina, and at Clemson College, South Carolina. The diseased portion of the hypocotyl or tap-root was triturated in a small quantity of water, allowed to stand a few minutes and the nematodes counted and identified. Eighty-six plants were examined, ten from the Pee Dee Station, forty-three from the Sandhill Station and thirty-three from Clemson College.

Aphelenchoides parietinus was found infesting 66 plants, 76 per cent of those examined. It occurred in numbers up to 106 per plant, averaging 10 per plant. It was most abundant in the Sandhill Station material where all except four of the plants examined harbored it with an average of 13 per plant.

Aphelenchus avenae (Bastian, 1865) was found in 43 plants, 50 per cent of those examined. It occurred in numbers up to 33 per plant, averaging 3.5 per plant. It was also most abundant in the Sandhill Station material where it occurred in twenty-eight of the plants examined, averaging 4.4 per plant.

Cephalobus sp. (very largely, perhaps exclusively, C. oxyuroides de Man, 1876) was found in 33 plants, or 58 per cent of those examined. It occurred in numbers up to 68 per plant averaging 5.4 per plant. In the Pee Dee Station material it was the predominating form, occurring in every plant examined and averaging 12.8 per plant.

Tylenchus pratensis de Man, 1881, was probably present in many of the plants examined although it was actually found in only seven. While it frequently enters the hypocotyl it is more especially an invader of the tap-

root and smaller roots and hence escaped detection. The upper portion of the tap-root and a short section of the base of the hypocotyl of 16 apparently normal plants were examined. Larvae of the above species were found in eight of these plants indicating that these roots had been invaded by mature females.

Acrobeles bütschlii de Man, 1885, was found in only one plant. However, it may have been somewhat more abundant, very young individuals being easily mistaken for species of Cephalobus.

An occasional specimen was found of Rhabditis lambdiensis Maupas, 1919, Diplogaster sp., Aphelenchoides tenuicaudatus (de Man, 1895), and Axonchium parvum Steiner, 1927.

An examination was also made of cotton seedlings grown in the Clemson College greenhouse under various moisture and temperature conditions. Untreated soil was used from nearby fields. The plants developed about the same types of lesions as those collected in the various fields and harbored about the same nematode fauna.

Thirteen greenhouse grown plants were selected as probably showing initial or very early stages in the development of lesions. The hypocotyl of each was carefully washed to remove nemas which might be adhering to the surface or immeshed in the root hairs, then triturated and examined in the usual way. In eight of these, no nematodes were found. The remaining five contained the following: (1) one specimen of Aphelenchoides parietinus, (2) one Cephalobus larva, (3) one specimen of A. parietinus, (4) two very small, immature nematode larvae, (5) one specimen of A. parietinus and one very small, immature nematode larva.

Eighteen greenhouse grown seedlings were selected as being healthy plants, with the hypocotyls free from discolored spots, punctures, or lesions. Each was washed, triturated and examined. Eight were apparently free from nematodes. The remaining seven contained the following: (1) one small Cephalobus larva, (2) one specimen of A. parietinus, (3) one very immature nematode larva, (4) one specimen of Tylenchus pratensis, (5) one specimen of Aphelenchus avenae, (6) one specimen of Aphelenchoides parietinus, (7) two specimens of A. parietinus, one specimen of Acrobeles bütschlii and one very minute nematode larva.

Nematodes dissected from field grown plants were placed on or near the hypocotyl of cotton seedlings growing under sterile conditions in agar. Positive results were secured in the case of one plant on the hypocotyl of which had been placed 100 nematodes, mostly Cephalobus oxyuroides. Examined 16 hours later the hypocotyl showed six pit-like lesions 200 to 300 μ in diameter and about 200 μ deep where the epidermis and underlying cortical cells appeared to have been destroyed mechanically. Three larvae of C. oxyuroides were definitely found in these pits.

Several greenhouse grown seedlings were selected, the hypocotyls of which showed small puncture-like lesions. Free-hand sections cut through the region of the lesions showed, in several instances, a small larva of C. oxyuroides coiled within an otherwise apparently healthy cell.

These observations indicate that C. oxyuroides is capable of producing small lesions on the hypocotyl of cotton seedlings and that this species and probably Aphelenchoides parietinus and Aphelenchus avenae will, occasionally at least, penetrate healthy tissue.

Twenty-one plants, collected from the same fields from which Christie secured his plants for the determinations of the nematodes, were studied histologically at the junction of the healthy and diseased areas of the cortex. Seventeen of these showed abundant nemas in the diseased area; in the other four, one to several were present. Seven of these plants showed small areas invaded by fungi. In no instance were hyphae seen interior to the region already attacked by nematodes. In only one instance were the hyphae closely adjacent to normal cells and in this instance the nematodes were present in the same area. In at least six of the plants the nematodes were attacking apparently normal cells.

At the junction of the diseased and normal region of the cortex there was usually a small callus-like cell proliferation which would indicate a protective reaction on the part of the seedling. In several instances the nemas had definitely attacked this callus-like structure. In no instance had the nematodes invaded the vascular cylinder.

Other histological studies seem to show that under certain conditions large intercellular spaces appear in the cortex of the basal portion of the hypocotyl. These spaces are especially large in "big shank" seedlings. Later the epidermis may become depressed into these spaces producing long, narrow, brown, sunken areas. What initiates these spaces is uncertain, but when once formed they are rapidly invaded by nemas, fungi, and bacteria, resulting in the typical soreshin of cotton.

These preliminary results indicate that various species of nematodes may cause the original injury through which fungi and bacteria invade the cortex; or if the nematodes do not initiate the lesions, they are apparently important agents in their enlargement. The authors do not wish to imply that under certain conditions fungi and bacteria may not be the most important agents in producing soreshin of cotton. There is abundant evidence of the importance of Corticium vagum, Fusarium spp., and probably bacteria in the frequent loss of stands in cotton. The presence of nematodes in apparently normal hypocotyls and roots and in all lesions, their occurrence at times when pathogenic fungi are apparently absent, and their demonstrated ability to penetrate living tissues would seem to indicate that they are an important agent in causing these losses. Further, a loss of stand is most common during cool periods of high soil moisture and it is under these conditions that the nematodes are most abundant and destructive.

MISCELLANEOUS NOTES

LOSSES FROM DISEASE IN ARKANSAS

There are no doubt many orchard trees still showing the effects of the severe freeze of the winter of 1930 followed by the drought of that particular year. There are orchards in which trees have been dying every year since then and I suspect that trees will perhaps continue to die for a number of years from that cause.

I am somewhat of the belief that black rot of grapes (Guignardia bidwellii) has never quite recovered from the check received during the drought of 1930. We have not had an extremely favorable year for black rot since that time but it appears to me that in some vineyards at least the disease was almost cleaned out that year.

There seems to be some indication that the bitter rot disease of apple (Glomerella cingulata) is slowly coming back after a period of nearly nine years in which it was of very little importance. I attribute this to the fact that the recent depression has caused many growers to stop spraying with Bordeaux in sufficient amounts to keep this disease out of the wood. Many growers last year put on no Bordeaux at all or only one or two sprays and these were the men who had bitter rot in their orchards.

I have no doubt that there has been considerably more cotton rust or potash hunger and cotton wilt (Fusarium vasinfectum) during the last year or two due to the fact that the low price of cotton has caused many growers to stop using commercial fertilizers on their fields. I believe that unless there is a change toward better fertilization this condition will be intensified in the next year or so.

Another thing that I have noted is the fact that in the change from the winter spray of commercial lime sulphur for peaches to the lubricating oil emulsion, many growers have failed to realize that the latter spray is not a fungicide and consequently when conditions are favorable more peach leaf curl (Exoascus deformans) appears. The last year or so, however, have been so dry and unfavorable for the development of peach leaf curl that the disease has been of practically no importance. (V. H. Young, Jan. 5).